

What is claimed is:

1. A MOSFET transistor structure formed in a substrate of semiconductor material having a first conductivity type; the MOSFET transistor structure comprising:

an active region of the substrate;

5 perimeter isolation dielectric material formed in the substrate along the entire perimeter of the active region to define a continuous sidewall interface between the isolation dielectric material and the active region;

spaced-apart source and drain regions having a second conductivity type opposite the first conductivity type formed in the active region to define a substrate
10 channel region therebetween, both the source region and the drain region also being spaced-apart from the sidewall interface; and

a conductive gate electrode that includes a first portion that extends over the substrate channel region and the second portion that extends continuously over the entire sidewall interface between the isolation dielectric material and the active
15 region, the conductive gate electrode being separated from the substrate channel region by intervening gate dielectric material.

2. A MOSFET transistor structure as in claim 1, and wherein the perimeter isolation dielectric material comprises silicon dioxide.

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3. A MOSFET transistor structure as in claim 1, and wherein the conductive gate electrode comprises polysilicon.

4. A MOSFET transistor structure as in claim 1, and wherein the gate dielectric
25 material comprises silicon dioxide.

5. A MOSFET transistor structure as in claim 1, and wherein the first conductivity type is P-type.

6. A MOSFET transistor structure as in claim 1, and wherein both the source region and the drain region are spaced-apart from the sidewall interface by about 1000-5000 Angstroms.

5 7. A method of forming a MOSFET transistor structure in a substrate of semiconductor material having a first conductivity type, the method comprising:

forming isolation dielectric material in the substrate such that the isolation dielectric material defines an active region of the substrate, the isolation dielectric material being formed along the entire perimeter of the active region to define a
10 continuous sidewall interface between the isolation dielectric material and the active region;

forming a layer of gate dielectric material that extends over the active region and over the continuous sidewall interface between the isolation dielectric material and the active region;

15 introducing dopant material into the active region to define spaced-apart source and drain regions having a second conductivity type opposite the first conductivity type and defining a substrate channel region therebetween, both the source region and the drain region being spaced-apart from the sidewall interface; and

forming a conductive gate on the gate dielectric material, the conductive gate
20 including a first portion that extends over the substrate channel region and a second portion that extends continuously over the entire sidewall interface between the isolation dielectric material and the active region, the conductive gate electrode being separated from the substrate channel region by intervening dielectric material.

25 8. A method as in claim 7, and wherein the both the source region and the drain region are formed to be space-apart from the sidewall interface by about 1000-5000 Angstroms.